

## Severe local storms, September, 1931—Continued

Place	Date	Time	Width of path (yards)	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
New Mexico (northern Rio Grande area).	23-24					Floods	Highways, railway, fields and crops damaged; homes flooded.	Official, U. S. Weather Bureau.
Norway (near), Kans.	24	7:30 p. m.	880		5,000	Tornado and hail	Livestock killed; crops injured; 10 persons hurt; path 8 miles long.	Do.
Rush County, Ind. (central).	25	2 p. m.	440-880			Thunderstorm and wind.	Considerable damage to buildings; telephone service interrupted.	Do.
Boston, Ind.	25	2:45 p. m.	100-130		100,000	Tornado	2 school buildings and a number of dwellings damaged; crops hurt; 25 persons injured.	Do.
Grayville (near), Ill.	25				4,500	Wind	Buildings damaged.	Do.
Anderson, S. C.	26	A. m.			10,000	Thunderstorm	Several barns and contents destroyed by lightning.	Do.

## RIVERS AND FLOODS

By MONTROSE W. HAYES

[In charge River and Flood Division]

Local overflows in small streams occurred in September in northwestern New York, Ohio, Michigan, Wisconsin, and New Mexico. The resulting damage was of minor consequence. A few rivers rose to stages slightly above bankful, as shown in the following table, but the only damage reported was in New Mexico, near Espanola, where there was estimated damage of \$1,500 to highways, and \$500 to crops:

Table of flood stages in September, 1931

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
	<i>Feet</i>			<i>Feet</i>	
Roanoke: Williamston, N. C.-----	9	1 26	1	9.9	1 31
Peedee: Poston, S. C.-----	18	1 29	1	18.9	1 31
MISSISSIPPI SYSTEM					
<i>Missouri Basin</i>					
Big Blue: Blue Rapids, Kans.-----	20	25	26	20.8	25
Grand:					
Gallatin, Mo.-----	20	26	26	23.3	26
Chillicothe, Mo.-----	18	26	27	20.8	26
<i>Ohio Basin</i>					
White, West Fork: Edwardsport, Ind.-----	10	17	18	12.0	18
WEST GULF OF MEXICO DRAINAGE					
Rio Grande: Espanola, N. Mex.-----	7	24	24	8.1	24

<sup>1</sup> In August.

All dates are in September, unless otherwise indicated.

## WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[By the Marine Division, W. F. McDONALD in charge]

## PRELIMINARY NOTE

The most important feature of the weather of the month from the marine standpoint was the occurrence of an unusual number of tropical disturbances, seven in American waters and at least four in Asiatic waters. The American group affected the Caribbean area, the Yucatan Peninsula, Mexico, and the Pacific coastal waters adjacent to Mexico, with one hurricane producing a major disaster at Belize, British Honduras, on September 10. Special articles appear elsewhere in this issue covering the American disturbances and the first of the typhoons. The discussion has therefore been limited to brief mention in those cases below.

## NORTH ATLANTIC OCEAN

By W. F. McDONALD

*The pressure situation.*—Average pressures for the month of September were much above normal in the region of the northeastern Atlantic, with the Shetland Islands apparently at the center of the pressure anomaly. On the other hand, the barometer averaged lower than normal over much of the western Atlantic, centering about Newfoundland and Nova Scotia, with the Gulf and West Indies showing a slight excess of pressure north of the twentieth parallel of latitude and a slight deficiency in the Caribbean Sea and Central America.

In so far as the averages for the month may be said to have significance, they represent a displacement of the normal North Atlantic HIGH northeastward, with a corresponding displacement of the LOW center of action to westward, so that the latter (resulting in fact from the combination of several separate movements of centers of low barometric pressure) obtained sway over the region of the northwestern Atlantic, Greenland, and Labrador. The mid-Atlantic HIGH was seldom well developed in the region between the Azores and Bermuda, the crest of this ridge probably being displaced southward during much of the month.

Early in the month, the movement of LOWS into the Atlantic was on an unusual track, almost due eastward along the latitude of 40°, the disturbances being as a rule but weakly developed, but nevertheless persistent in their progress eastward over the area normally occupied by well-developed HIGH formations. After the 6th a persistent HIGH was set up over the British Isles that lasted almost continuously until the 30th.

Beginning about the 10th, the LOWS over the northwestern Atlantic and adjacent land areas became more intense and in general moved slowly northeastward, crossing Greenland and passing mostly to the northward of Iceland. These developments culminated in an exceptionally deep cyclonic depression, season considered, which was central over the Strait of Belle Isle on the 25th, with minimum pressure below 29 inches.

Charts VIII to XI, in this issue, cover four of the daily pressure situations over the Atlantic in September, the first three giving the general setting for hurricane movements, and the last showing the conditions attending the stormiest day of the month, in point of number of gales reported, on the main northern trans-Atlantic steamer routes. Table 1 gives some details of the monthly barometric pressures.

**Gales and tropical disturbances.**—Three tropical storm movements crossed the Caribbean area in the month, these being discussed at length in a separate article in this number of the REVIEW. It is worthy of note here, however, that no ship reporting to this bureau encountered winds of hurricane force in connection with these storms in the open sea on the Atlantic side of the continent, the hurricane damages being inflicted on the coasts as the storms passed.

Most of the gale reports on the main trans-Atlantic steamer routes appear on the 23d to 25th, at which time winds of force 8 to 9 were encountered quite generally over the area between 30° and 60° W. longitude and north of 45° latitude.

**Fog.**—Fog continued to decrease over the North Atlantic, being confined mostly to the vicinity of the Grand Banks where it was reported in places on about 25 per cent of the days of the month, with some fog off the entrance to New York Harbor on the 5th, 12th, and 13th. A brief spell of rather extensive foginess, on the 17th and 18th, was encountered between mid-Atlantic and the British Isles.

**Trans-Atlantic aviation.**—The only attempt at a crossing of the Atlantic by airplane during September was the

Rody-Johanssen-Viega flight westward from Portugal, beginning on the morning of the 13th. The plane was sighted over the Azores on its way out into midocean on a course toward Nova Scotia, and after 33 hours was sighted again, about 400 miles east of Halifax, by the steamship *Pennland*. The flyers were forced down, however, without making land, and were rescued only after floating at sea for a week, being picked up by the Norwegian motor ship *Belmoira* off Newfoundland on the 22d. The situation on the 14th, when the flyers were forced down, is depicted on Chart X.

TABLE 1.—Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, September, 1931

Stations	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Julianehaab, Greenland <sup>1</sup> .....	29.89		30.36	1st.....	29.24	29th.
Reykjavik, Iceland <sup>1</sup> .....	29.95	+0.22	30.39	20th.....	29.24	26th.
Lerwick, Shetland Isles <sup>1</sup> .....	30.10	+0.26	30.57	21st.....	29.71	3d.
Valentia, Ireland <sup>1</sup> .....	30.22	+0.23	30.62	26th.....	29.44	3d.
Lisbon, Portugal <sup>1</sup> .....	30.05	+0.03	30.27	12th.....	29.87	23d.
Madeira <sup>1</sup> .....	30.04	+0.03	30.23	26th.....	29.84	23d.
Horta, Azores <sup>1</sup> .....	30.15	-0.02	30.39	11th.....	29.79	6th.
Belle Isle, Newfoundland <sup>1</sup> .....	29.80	-0.10	30.24	17th.....	28.96	26th.
Halifax, Nova Scotia <sup>1</sup> .....	29.91	-0.14	30.22	do.....	29.46	25th.
Nantucket <sup>1</sup> .....	29.98	-0.10	30.43	30th.....	29.52	24th.
Hatteras <sup>1</sup> .....	30.06	0	30.47	do.....	29.70	27th.
Bermuda <sup>1</sup> .....	30.07	-0.01	30.22	22d.....	29.86	29th.
Turks Island <sup>1</sup> .....	30.02	+0.04	30.08	26th.....	29.94	18th.
Key West <sup>1</sup> .....	29.95	+0.01	30.13	30th.....	29.80	9th.
New Orleans <sup>1</sup> .....	30.02	+0.04	30.23	do.....	29.84	8th.
Cape Gracias, Nicaragua <sup>1</sup> .....	29.84	-0.07	29.90	20th.....	29.74	19th.

<sup>1</sup> All data based on a. m. observations only, with departure computed from best available normals related to time of observation.

<sup>2</sup> Corrected 24-hour means, based on more than one observation daily.

OCEAN GALES AND STORMS, SEPTEMBER, 1931

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH ATLANTIC OCEAN													
Jamaica Pioneer, Br. S.S.	Kingston, Jamaica.	Rotterdam	43 04 N	40 44 W	Sept. 2	2 p., 2----	Sept. 4	Inches 29.92	ESE		ESE	ESE, 8-----	Steady.
City of Alton, Am. S. S.	Rotterdam	New York	50 12 N	6 30 W	Sept. 3	2 a., 4-----	do-----	29.38	NW	NW, 8-----	NW	NW, 8-----	Do.
Brave Coeur, Am. S. S.	New Orleans	London	49 25 N	16 30 W	do-----	6 a., 3-----	Sept. 3	29.65	N	NE, 9-----	N	NE, 9-----	N-NNE-N.
City of Alton, Am. S. S.	Rotterdam	New York	51 00 N	26 50 W	Sept. 7	8 a., 7-----	Sept. 7	29.68	SE	SE, 8-----	SE	SE, 8-----	Steady.
Illinois, Am. S. S.	San Pedro	Providence, R. I.	15 20 N	76 28 W	Sept. 8	9 a., 8-----	Sept. 8	29.53	NE	NE, 11-----	ESE	NE, 11-----	NE-E.
President McKinley, Am. S. S.	New York	Cristobal	16 07 N	81 45 W	Sept. 9	1:30 p., 9-----	Sept. 9	29.38	E	SSE, 10-----	S	E, 11-----	E-SE.
Atenas, Am. S. S.	New Orleans	Port Limon and return.	16 39 N	83 00 W	do-----	5 p., 9-----	do-----	29.49	E	E, 9-----	SE	SE, 9-----	E-SE.
Heredia, Am. S. S.	do-----	Puerto Barrios, etc.	16 49 N	87 00 W	Sept. 10	11:30 a., 10-----	Sept. 10	29.60	WSW	S, 10-----	SE	—, 10-----	WSW-SE-S.
Gatun, Hond. S. S.	do-----	Celba, Honduras, and return.	18 19 N	86 42 W	do-----	1 p., 10-----	do-----	29.74	E	ESE, 9-----	SE	ESE, 9-----	E-S-ESE-SE.
Milwaukee, Germ. M. S.	Cobh	New York	47 10 N	39 20 W	Sept. 11	9:24, 11-----	Sept. 11	29.75	SSE	S, 8-----	SSW	S, 8-----	SE-S-SW.
Do	do-----	do-----	46 00 N	42 58 W	Sept. 12	9:12, 12-----	Sept. 12	29.40	SW	S, 8-----	W	S, 8-----	SW-S-W.
Ambridge, Am. S. S.	Rotterdam	do-----	50 20 N	30 47 W	do-----	4 p., 15-----	Sept. 16	29.91	W	SSW, 7-----	WSW	S, 8-----	WSW - SSW - S-W.
Amapala, Hond. S. S.	Celba	do-----	19 20 N	85 50 W	Sept. 14	1 a., 14-----	Sept. 14	29.85	NNE	NE, 9-----	ESE	—, 8-----	NNE-ESE.
Wytheville, Am. S. S.	Rotterdam	do-----	49 00 N	40 52 W	Sept. 22	5:20 a., 23-----	Sept. 24	28.87	E	NNW, 9-----	W-N	NW, 9-----	E-SE-NW.
Collamer, Am. S. S.	Bordeaux	do-----	48 25 N	39 15 W	Sept. 23	4 p., 23-----	do-----	29.11	SSW	WNW, 8-----	W	WNW, 9-----	SW-W-WNW.
Europa, Germ. S. S.	Cherbourg	do-----	48 49 N	27 22 W	do-----	6:00, 23-----	do-----	29.61	S	SSE, 9-----	W	SE, 9-----	6 points.
Belgenland, Br. S. S.	New York	Plymouth	47 47 N	31 22 W	do-----	4 p., 23-----	do-----	29.37	S	SSE, 7-----	SSE	SSE, 9-----	Steady.
Cameronia, Br. S. S.	Glasgow	New York	50 20 N	43 40 W	do-----	9 a., 23-----	do-----	29.17	ENE	NNW, 9-----	W	NNW, 9-----	NE-N-NNW.
Tiger, Norw. T. K. S. S.	Baton Rouge	Bergen	52 59 N	41 12 W	do-----	9:30 a., 24-----	do-----	28.65	N	WNW, 3-----	WNW	NNW, 9-----	N-WNW.
Tiger, Norw. T. K. S. S.	Baton Rouge	Baltimore	50 39 N	26 24 W	do-----	6 a., 24-----	Sept. 23	29.64	SE	SE, 8-----	S	SE, 9-----	SE-S-SW.
Cameronia, Br. S. S.	Baton Rouge	Bergen	53 26 N	39 45 W	Sept. 24	5 p., 24-----	Sept. 25	28.94	SW	SW, 4-----	SW	SW, 8-----	
Ale, Am. S. S.	Antwerp	New York	44 40 N	56 37 W	do-----	6:15 a., 25-----	Sept. 26	29.13	SSE	SSE, 7-----	W	WSW, 9-----	SSE-W.
Collamer, Am. S. S.	Antwerp	Baltimore	49 44 N	38 00 W	Sept. 25	10:30 a., 26-----	Sept. 27	29.74	S	WSW, 7-----	W	SW, 9-----	S-SW-S.
City of Alton, Am. S. S.	Bordeaux	New York	47 02 N	50 05 W	do-----	3 a., 26-----	Sept. 26	29.48	SW	WSW, 8-----	W	W, 9-----	WSW-W.
City of Alton, Am. S. S.	New York	Rotterdam	42 48 N	59 30 W	do-----	—, 25-----	do-----	29.43	WNW	WNW, 7-----	W	W, 8-----	Steady.
Ola, Br. T. K. S. S.	Port Arthur	Montreal	48 50 N	63 54 W	do-----	—, 25-----	Sept. 25	29.14	NW	WNW, 10-----	NW	NW, 10-----	Do.
Cold Harbor, Am. S. S.	Boston	Manchester, England.	49 12 N	43 48 W	Sept. 26	9 a., 26-----	Sept. 27	29.64	S	SW, 8-----	WSW	SW, —-----	S-SW.
George H. Jones, Am. S. S.	Las Piedras	New York	14 49 N	71 50 W	Sept. 7	11 p., 7-----	Sept. 8	29.60	S	S, 8-----	SE	S, 8-----	WSW-S.
Calamares, Am. S. S.	Habana	Cristobal	17 08 N	82 04 W	Sept. 9	5 p., 9-----	Sept. 9	29.67	E	E, 7-----	SSE	SE, 8-----	E-SE.
Alegria, Hond. S. S.	Philadelphia	Port Antonio, Jamaica.	18 12 N	77 02 W	Sept. 12	2 p., 12-----	Sept. 12	29.72	NE	SSE, 11-----	SSW	SSE, 11-----	NE-SE.
Cartago, Am. S. S.	New Orleans	Puerto Barrios	19 25 N	85 50 W	Sept. 13	4 a., 14-----	Sept. 14	29.68	ENE	ENE, 7-----	SE	SE, 7-----	ENE-SE.